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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/820,463	03/28/2001	Srinivas Nemani	4778/DD/LOW K/JW	5650
32588	7590	07/01/2004	EXAMINER	
APPLIED MATERIALS, INC. 2881 SCOTT BLVD. M/S 2061 SANTA CLARA, CA 95050			RAO, SHRINIVAS H	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 07/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/820,463	NEMANI ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Steven H. Rao	2814	<i>A</i>

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 30 April 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,4-24 and 74-109 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1,4-24,74-109 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

Art Unit: 2814

## **DETAILED ACTION**

### ***Priority***

The Applicant as currently filed does not claim priority from any prior patent application; therefore presently the earliest available filling date is the U.S. filling date namely March 28, 2001.

### ***Request for Continued Prosecution Examination (RCE)***

The request filed on 9/8/2000 for a Request for Continued Prosecution Application (RCE) under 37 CFR 1.114 (d) based on parent Application No. 09/302165 is acceptable and has been entered and forwarded to the Examiner on May 06, 2004, a RCE has been established. An action on the RCE follows.

### ***Information Disclosure Statement***

No further Ids has been filed after that filed on April 07, 2003.

### ***Preliminary Amendment Status***

Acknowledgment is made of entry of preliminary amendment filed 4 /30 / 2004 along with the RCE.

Therefore claims 1, 4-24 and 74-109 as previously presented and recited in the preliminary amendment of April 30, 2004 (without any amendments are currently pending in the Application).

Art Unit: 2814

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,4 –10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chaing et al. (U.S. Patent no. US2002/0068458 A1 herein after Chiang) in view of Jiang et al. (U.S. Patent No. 2002/0081855 A1, herein after Jiang).

(The previous rejection is reproduced below, for response to Applicants' arguments see section response to Applicants' arguments section below).

With respect to claim 1 Chaing describes a method of thin film deposition for integrated circuit fabrication, comprising:

Providing a substrate; (Chaing abstract line 2, etc.) treating the substrate with a plasma prior to forming a organosilicate layer, ( Chiang para 0012) .

Chaing does not specifically mention wherein the plasma is generated in a reaction chamber by applying an electric field to a gas mixture comprising molecular oxygen (O<sub>2</sub>) and molecular hydrogen (H<sub>2</sub>);

However Jiang at least in para 0013 teaches that the H<sub>2</sub>O<sub>2</sub> plasma chemistry is an equivalent plasma chemistry known in the art and wherein the plasma is generated in a reaction chamber by applying an electric field to a gas mixture comprising molecular oxygen (O<sub>2</sub>) and molecular hydrogen (H<sub>2</sub>);

Therefore it would have been obvious for one of ordinary skill in the art at the time of the invention substitute Jiang's method of the H<sub>2</sub>O<sub>2</sub> or H<sub>2</sub>O plasma chemistry

Art Unit: 2814

and wherein the plasma is generated in a reaction chamber by applying an electric field to a gas mixture comprising molecular oxygen (O<sub>2</sub>) and molecular hydrogen (H<sub>2</sub>) for Chiang's method of generating plasma in Chiang's process steps to reduce or eliminate the resist poisoning. ( Jiang para 0013).

The remaining limitations of claim 1 are :  
forming the organosilicate layer on the substrate; ( Chaing par 0049) and treating the organosilicate layer with the plasma. ( Chaing paras 0025 and 0049).

With respect to claim 4 , Chaing describes the method of claim 1, wherein the gas mixture further comprises at least one gas selected from the group consisting of helium (He), argon (Ar), nitrogen (N<sub>2</sub>), and combinations thereof. ( Chaing para 0025, etc.)

With respect to claim 5 Chaing describes the method of claim 1, wherein the electric field is provided by a radio -frequency (RF) power. ( Chaing para 0025).

With respect to claim 6 Chaing describes the method of claim 5, wherein the RF power is within a range of about 1 watt/cm<sup>2</sup> to about 100 watts/cm<sup>2</sup>. ( rejected for same reasons as set out previously) .

Re claim 7 The method of claim 1, wherein the reaction chamber is maintained at a pressure within a range of about 1 Torr to about 10 Torr. ( see rejection mailed on 4/7/2003)

Re claim 8 The method of claim 1, wherein the plasma treatment is performed at a temperature within a range of about 50 °C to about 400 °C. ( see rejection mailed on 4/7/2003)

Art Unit: 2814

Re claim 9 The method of claim 1, wherein the oxygen (O<sub>2</sub>)/hydrogen (H<sub>2</sub>) gases are provided to the reaction chamber at flow rates within a range of about 500 sccm to about 5,000 sccm. ( see rejection mailed on 4/7/2003)

Re claim 10 The method of claim 4, wherein the at least one gas is provided to the reaction chamber at flow rates within a range of about 500 sccm to about 5,000 sccm. ( see rejection mailed on 4/7/2003).

**B.** Claims 11–24 and 74 –109 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chaing et al. ( U.S. Patent no. US2002/0068458 A1 herein after Chiang) and Jiang et al. ( U.S. Patent No. 2002/0081855 A1, herein after Jiang) as applied to claims 1, 4-10 above and further in view of Vincent et al. ( U.S. pre grant publication No. 2002/0142579 A1, herein after Vincent) .

With respect to claims 11 and 74-76 Chaing and Jiang describe the method of claim 1, wherein the organosilicate layer is formed by: positioning the substrate in a deposition chamber;  
providing a second gas mixture to the deposition chamber ( Chaing abstract line 2 etc.).

Chiang and Jaing do not specifically describe wherein the second gas mixture comprises a silicon source, a carbon source, and an oxygen source; and applying an electric field to the second gas mixture in the deposition chamber to form the carbon-containing silicate layer on the substrate.

However Vincent in paras 0058 to 0060, 0066 and 0084 describes wherein the second gas mixture comprises a silicon source, a carbon source, and an oxygen source; and applying an electric field to the second gas mixture in the deposition chamber to form the carbon-containing silicate layer on the substrate to combine the

Art Unit: 2814

desired mechanical and electrical properties that are paramount for integrating low k dielectric materials in integrated circuits and to include steps of forming organosilicate layer in combination with low dielectric constant film.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Vincent's steps of the second gas mixture comprising a silicon source, a carbon source, and an oxygen source; and applying an electric field to the second gas mixture in the deposition chamber to form the carbon-containing silicate layer on the substrate to combine the desired mechanical and electrical properties that are paramount for integrating low k dielectric materials in integrated circuits and to include steps of forming organosilicate layer in combination with low dielectric constant film. ( Vincent paras 0028-0029, etc.) .

Re claim 12 the method of claim 11, wherein the silicon source and the carbon source comprise an organosilane compound having the general formula  $\text{Si}_a\text{C}_b\text{H}_c\text{O}_d$ , where a has a range between 1 and 2, b has a range between 1 and 10, c has a range between 6 and 30, and d has a range between 0 and 6. ( see previous rejection)

Re claim 13. the method of claim 12, wherein the organosilane compound is selected from the group consisting of methylsilane ( $\text{SiCH}_3$ ), dimethylsilane ( $\text{SiC}_2\text{H}_6$ ), trimethylsilane ( $\text{SiC}_3\text{H}_8$ ), tetramethylsilane ( $\text{SiC}_4\text{H}_{10}$ ), methoxysilane ( $\text{SiCH}_3\text{O}$ ), dimethyldimethoxysilane ( $\text{SiC}_2\text{H}_4(\text{OCH}_3)_2$ ), diethyldiethoxysilane [ $(\text{SiC}_2\text{H}_5)_2\text{O}$ ] ( $\text{SiC}_4\text{H}_{10}\text{O}$ ), dimethyldiethoxysilane ( $\text{SiC}_2\text{H}_4(\text{OCH}_2\text{CH}_3)_2$ ), diethyldimethoxysilane ( $\text{SiC}_2\text{H}_5(\text{OCH}_3)_2$ ), hexamethyldisiloxane ( $\text{Si}_2\text{C}_6\text{H}_{14}\text{O}_2$ ), bis(methylsilano)methane ( $\text{Si}_2\text{C}_2\text{H}_6$ ), 1,2bis(methylsilano)ethane ( $\text{Si}_2\text{C}_4\text{H}_{14}$ ), and combinations thereof. ( see previous rejection , rejected for the same reasons).

Art Unit: 2814

Re Claim 14 the method of claim 31, wherein the oxygen source is selected from the group consisting of nitrous oxide (N<sub>2</sub>O), oxygen (O<sub>2</sub>), ozone (O<sub>3</sub>), carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), and combinations thereof. ( Vincent para 0031).

Re Claim 15 the method of claim 11, wherein the electric field applied to the second gas mixture in the deposition chamber is provided by a radio frequency (RF) power. ( Vincent para 0084).

Re Claim 16 the method of claim 15, wherein the RF power is within a range of about 1 watt/cm<sup>2</sup> to about 500 watts/cm<sup>2</sup>. ( Vincent Table 4).

Re Claim 17 the method of claim 11, wherein the deposition chamber is maintained at a pressure (between about 1 Torr to about 500 Torr. ( Vincent para 0070).

Re Claim 18 the method of claim 12, wherein the organosilane compound is provided to the deposition chamber at a flow rate in a range of about 50 sccm to about 1,000 sccm. ( Vincent para 0070).

Re Claim 19 the method of claim 11, wherein the oxygen source is provided to the deposition chamber at a flow rate in a range of about 10 sccm to about 200 sccm. . ( Vincent para 0068).

Re Claim 20 the method of claim 12, wherein the ratio of the oxygen source to the organosilane compound is about 1:1 to about 1:5. ( Vincent para 0062).

Re Claim 21 the method of claim 11, wherein the deposition chamber is maintained at a temperature between about 50 °C to about 500 °C. ( Vincent table 4).

Re Claim 22 the method of claim 11, wherein the second gas mixture further comprises an inert gas. ( Vincent Table 4).



Art Unit: 2814

Re Claim 23. the method of claim 22, wherein the inert gas is selected from the group consisting of helium (He), argon (Ar), neon (Ne), xenon (Xe), and combinations thereof. ( Vincent table 4).

Re Claim 24. the method of claim 22, wherein the inert gas is provided to the deposition chamber at a flow rate in a range of about 10 sccm to about 1,000 sccm. ( Vincent Table 4).

(Claims 74-76 have been rejected along with claim 11 above).

Re claim 77. The method of claim 76, wherein the electric field is provided by a radio frequency (RF) power. ( rejected for reasons stated under claim 5 above).

Re claim 78. The method of claim 77, wherein the RF power is within a range of about 1 watt/cm<sup>2</sup> to about 500 watt/cm<sup>2</sup>. ( rejected for reasons stated under claim 6 above).

Re claim 79. The method of claim 78, wherein the reaction chamber is maintained at a pressure within a range of about 1 Torr to about 10 Torr. (rejected for reasons stated under claim 7 above).

Re claim 80. The method of claim 74, wherein the plasma treatment is performed at a temperature within a range of about 50 °C to about 400 °C. (rejected for reasons stated under claim 8 above).

Re claim 81 the method of claim 74, wherein the molecular oxygen (O<sub>2</sub>) and molecular hydrogen (H<sub>2</sub>) gases are provided to the reaction chamber at flow rates within a range from about 500 sccm to about 5,000 sccm. (rejected for reasons stated under claim 9 above).

Art Unit: 2814

Re claim 82 the method of claim 76, wherein the at least one gas is provided to the reaction chamber with a flow rate at a range from about 500 sccm to about 5,000 sccm. (rejected for reasons stated under claim 9 above).

Re claim 83 the method of claim 74, wherein the silicon source and the carbon source comprise an organosilane compound having the general formula  $\text{Si}_a\text{C}_b\text{H}_c\text{O}_d$ , where a has a range between 1 and 2, b has a range between 1 and 10, c has a range between 6 and 30 and d has a range between 0 and 6. (rejected for reasons stated under claim 12 above).

Re claim 84 the method of claim 83, wherein the organosilane compound is selected from the group consisting of methylsilane ( $\text{SiCH}_3$ ), dimethylsilane ( $\text{SiC}_2\text{H}_6$ ), trimethylsilane ( $\text{SiC}_3\text{H}_9$ ), tetramethylsilane ( $\text{SiC}_4\text{H}_{12}$ ), methoxysilane ( $\text{SiCH}_3\text{O}$ ), dimethyldimethoxysilane ( $\text{SiC}_4\text{H}_{10}\text{O}_2$ ), diethyldiethoxysilane ( $\text{SiC}_8\text{H}_{18}\text{O}_2$ ), dimethyldiethoxysilane ( $\text{SiC}_6\text{H}_{16}\text{O}_2$ ), diethyldimethoxysilane ( $\text{SiC}_8\text{H}_{18}\text{O}_2$ ), hexamethyldisiloxane ( $\text{Si}_2\text{C}_6\text{H}_{14}\text{O}$ ), bis(methylsilano)methane ( $\text{Si}_2\text{C}_3\text{H}_{12}$ ), 1,2bis(methylsilano)ethane ( $\text{Si}_2\text{C}_4\text{H}_{14}$ ) and combinations thereof. (rejected for reasons stated under claim 13 above).

Re claim 85 the method of claim 84, wherein the oxygen source is selected from the group consisting of nitrous oxide ( $\text{N}_2\text{O}$ ), oxygen ( $\text{O}_2$ ), ozone ( $\text{O}_3$ ), carbon monoxide ( $\text{CO}$ ), carbon dioxide ( $\text{CO}_2$ ) and combinations thereof. (rejected for reasons stated under claim 13 above).

Re claim 86 the method of claim 74, wherein the second electric field applied to the gas mixture in the deposition chamber is provided by a radio frequency (RF) power. (rejected for reasons stated under claims 5 and 77 above).

Art Unit: 2814

Re claim 87 the method of claim 86, wherein the RIF power is within a range from about 1 watt/cm<sup>2</sup> to about 100 watts/cm<sup>2</sup>. (rejected for reasons stated under claims 6 and 78 above).

Re claim 88 the method of claim 87, wherein the deposition chamber is maintained at a pressure between about 1 Torr to about 10 Torr. (rejected for reasons stated under claims 7 and 79 above).

Re claim 89 the method of claim 83, wherein the organosilane compound is provided to the deposition chamber at a flow rate in a range of about 50 sccm to about 1,000 sccm. (rejected for reasons stated under claims 9 and 81 above).

Re claim 90 the method of claim 85, wherein the oxygen source is provided to the deposition chamber at a flow rate in a range of about 10 sccm to about 200 sccm. (rejected for reasons stated under claims 9 and 81 above).

Re claim 91 the method of claim 90, wherein the ratio of the oxygen source to the organosilane compound is about 1:1 to about 1:5. (rejected for reasons stated under claims 20 above).

Re claim 92 the method of claim 74, wherein the second gas mixture further comprises an inert gas. (rejected for reasons stated under claims 22 above).

Re claim 93 the method of claim 92, wherein the deposition chamber is maintained at a temperature between about 50 °C to about 500 °C . (rejected for reasons stated under claims 21 above).

Re claim 94 the method of claim 93, wherein the inert gas is selected from the group consisting of helium (He), argon (Ar), neon (Ne), xenon (Xe), and combinations thereof. (rejected for reasons stated under claims 23, etc. above).

Art Unit: 2814

Re claim 95 the method of claim 94, wherein the inert gas is provided to the deposition chamber at a flow rate in a range from about 10 sccm to about 1,000 sccm. ( rejected for reasons stated under claim 24 above).

Re claim 96 method of thin film deposition of an organosilicate layer, comprising: positioning a substrate in a deposition chamber; depositing the organosilicate layer from a gas mixture, wherein the gas mixture comprises a silicon source, a carbon source and an oxygen source; and treating the organosilicate layer with a plasma, wherein the plasma is generated by applying an electric field to a second gas mixture comprising molecular oxygen gas and molecular hydrogen gas. ( rejected for reasons stated under claim 1, etc. above).

Re claim 97 the method of claim 96, wherein the substrate is treated with the plasma before deposition of the organosilicate layer. ( rejected for reasons stated under claim 11, etc. above).

Re claim 98 the method of claim 96, wherein the gas mixture further comprises at least one gas elected from the group consisting of helium (He), argon (Ar), nitrogen (N<sub>2</sub>) and combinations thereof. ( rejected for reasons stated under claim 11, etc. above).

Re claim 99 the method of claim 98, wherein the electric field is provided by a radio frequency (RF) power. ( rejected for reasons stated under claim 5, etc. above).

Re claim 100 the method of claim 99, wherein the RF power is within a range of about 1 watts/cm<sup>2</sup> to about 500 watts/cm<sup>2</sup>. ( rejected for reasons stated under claim 6, etc. above).

Art Unit: 2814

Re claim 101 the method of claim 98, wherein the reaction chamber is maintained at a pressure within a range of about 1 Torr to about 500 Torr. ( rejected for reasons stated under claims 7,17 etc. above).

Re claim 102 the method of claim 98, wherein the plasma treatment is performed at a temperature within a range of about 50 °C to about 400 °C. (rejected for reasons stated under claims 8, etc. above).

Re claim 103.the method of claim 96, wherein the molecular oxygen (O<sub>2</sub>) and molecular hydrogen (H<sub>2</sub>) gases are provided to the reaction chamber at flow rates within a range from about 500 sccm to about 5,000 sccm. (rejected for reasons stated under claims 9, etc. above).

Re claim 104 the method of claim 98, wherein the at least one gas is provided to the reaction chamber with a flow rate at a range from about 500 sccm to about 5,000 sccm. (rejected for reasons stated under claims 10, etc. above).

Re claim 105 the method of claim 96, wherein the silicon source and the carbon source comprise an organosilane compound having the general formula  $\text{SiC}_a\text{H}_b\text{O}_d$ , where a has a range between 1 and 2, b has a range between 1 and 10, c has a range between 6 and 30 and d has a range between 0 and 6. (rejected for reasons stated under claims 12, etc. above).

Re claim 106 the method of claim 105, wherein the organosilane compound is selected from the group consisting of methylsilane (SiCH<sub>3</sub>), dimethylsilane (SiC<sub>2</sub>H<sub>6</sub>), trimethylsilane (SiC<sub>3</sub>H<sub>8</sub>), tetra methyl silane (SiC<sub>4</sub>H<sub>10</sub>), methoxysilane (SiCH<sub>3</sub>O), dimethyldimethoxysilane (SiC<sub>2</sub>H<sub>5</sub>O<sub>2</sub>), diethyldiethoxysilane (SiC<sub>4</sub>H<sub>10</sub>O<sub>2</sub>), dimethyldiethoxysilane (SiC<sub>2</sub>H<sub>5</sub>O<sub>2</sub>), diethyldimethoxysilane (SiC<sub>4</sub>H<sub>10</sub>O<sub>2</sub>),

Art Unit: 2814

hexamethyldisiloxane ( $\text{Si}_2\text{CeHrt80}$ ), bis(methylsilano)methane ( $\text{Si}_2\text{C}_3\text{H}_{12}$ ), 1,2bis(methylsilano)ethane ( $\text{Si}_2\text{C}_4\text{H}_4$ ) and combinations thereof. (rejected for reasons stated under claims 13, etc. above).

Re claim 107 the method of claim 105, wherein the oxygen source is selected from the group consisting of nitrous oxide ( $\text{N}_2\text{O}$ ), oxygen ( $\text{O}_2$ ), ozone ( $\text{O}_3$ ), carbon monoxide ( $\text{CO}$ ), carbon dioxide ( $\text{CO}_2$ ) and combinations thereof. (rejected for reasons stated under claims 14, etc. above).

Re claim 108 the method of claim 107, wherein the oxygen source is, provided to the deposition chamber at a flow rate in a range of about 10 sccm to about 200 sccm. (rejected for reasons stated under claims `19, etc. above).

Re claim 109 the method of claim 108, wherein the ratio of the oxygen source to the organosilane compound is about 1:1 to about 1:5. (rejected for reasons stated under claims 20, etc. above).

#### ***Response to Arguments***

Applicants' arguments filed on May 06, 2004 have been fully considered but they are not persuasive for the following reasons:

Applicants' first contention that Jiang does not teach generating a gas mixture comprising molecular oxygen ( $\text{O}_2$ ) and molecular hydrogen ( $\text{H}_2$ ) is not persuasive because Jaing states generating a plasma from  $\text{H}_2\text{O}_2$  or  $\text{H}_2\text{O}$  and other gases ( as agreed to by the Applicants' ) .

It is further well known that  $\text{H}_2\text{O}_2$  or  $\text{H}_2\text{O}$  when subjected to plasma will disassociate ultimately into hydroxyl radical (  $\text{OH}$  ), molecular hydrogen ( $\text{H}_2$ ) and also molecular (  $\text{O}$  ) as shown below.

Art Unit: 2814

Applicants' contention that  $H_2O_2$  will dissociate into only hydroxyl radicals (OH) and hydrogen radicals (H) is an incomplete recitation of the dissociated molecules.

It is very clear for the dissociation to be stichiometrically correct if  $H_2O_2$  forms (OH) (the first O molecule forms OH) and H, than to account for second O molecule ( $O_2$ ) of the two molecules present in  $H_2O_2$  it must form molecular oxygen (O) because following the logic (reaction) set out In the affidavit/deceleration the two H atoms are used in H molecule and OH radical and one of the O molecule is used in the OH radical leaving an O molecule by itself. (The first O molecule forms OH) i.e. forming both molecular (H) and molecular (O), (and additionally hydroxyl radical- not relevant for the present purposes) identical to the present claim recitations.

In fact the complete list of disassociated molecules would include the following :  
hydroxyl radicals (OH) and hydrogen radicals (H) and Oxygen radicals (O) .

Secondly Applicants' have conveniently left out the disassociation products of plasma treatment of  $H_2O$  which when dissociated will produce molecular oxygen ( $O_2$ ) and molecular hydrogen ( $H_2$ ) identical to that recited in the present claims.

Similar arguments were made with respect to claims 11-24 and 74-109.

Therefore all presently claims are rejected over the above applied art for reasons stated above.

The deceleration of Applicant Li-Qun Xia is not persuasive for the following reasons:

(a) As the affiant and applicant of the present application are one and the same, the probative value of (any party interested in the outcome) is minimum. That is the conclusions in the affidavit can only be given very little evidentiary value.

Art Unit: 2814

(b) Applicants' failure to recite a complete and stoichiometrically list of all dissociated radicals e.g. specifically omitting to mention the second oxygen radical (O) of the two (2) oxygen present in  $H_2O_2$  completely eliminates any remaining evidentiary value of the affidavit.

(c) Applicants' failure to mention or even discuss the dissociation products of  $H_2O$  when subjected to plasma namely molecular oxygen ( $O_2$ ) and molecular hydrogen ( $H_2$ ) (identical to that recited in the present claims) further confirms that after full, faith and consideration no evidentiary value can be given to Affidavit of Mr. Li-Qun Xia filed on April 30, 2004.

Therefore contrary to Applicants' assertion one of ordinary skill in the art of semiconductors would easily realize that plasma treatment of  $H_2O_2$  or  $H_2O$  when dissociated will produce molecular oxygen ( $O_2$ ) and molecular hydrogen ( $H_2$ ) identical to that recited in the present claims.

Applicant's arguments filed July 14, 2003 have been fully considered but they are not persuasive.

It is noted that Applicants' analysis is based impermissible piecemeal attacks on individual references whereas the rejection is based on the combined teachings of Chaing and Jiang; and Chaing, Jiang and Vincent.

It is well settled law that, " In response to Applicant's piecemeal analysis of the references, it has been held that one cannot show non-obviousness by attacking references individually where, as here, the rejections are based on combinations of references. In re Keller, 208 USPQ 871 (CCPA 1981).



Art Unit: 2814

Therefore claims 1 and 3-10 are obvious over the combined teachings as applied in the rejections.

Claims 11-24 were alleged to be allowable for the same reasons stated under claims 1 and 3-10 above.

However as seen above the reasons stated with regard to claims 1 and 3-10 above are not persuasive and therefore they are not persuasive here with regard to claims 11-24 also.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. Rao whose telephone number is ((571) 272-1718. The examiner can normally be reached on 8.00 to 5.00.

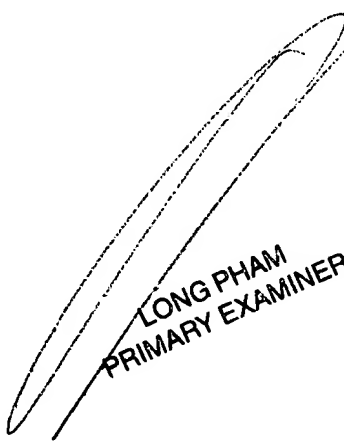
The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 3067722.

  
Steven H. Rao

Patent Examiner

June 25, 2004.

  
LONG PHAM  
PRIMARY EXAMINER